

Grade 8

Mathematics

Item Specifications



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Introduction

In 2014 Missouri legislators passed House Bill 1490, mandating the development of the Missouri Learning Expectations. In April of 2016, these Missouri Learning Expectations were adopted by the State Board of Education. Groups of Missouri educators from across the state collaborated to create the documents necessary to support the implementation of these expectations.

One of the documents developed is the item specification document, which includes all Missouri grade level/course expectations arranged by domains/strands. It defines what could be measured on a variety of assessments. The document serves as the foundation of the assessment development process.

Although teachers may use this document to provide clarity to the expectations, these specifications are intended for summative, benchmark, and large-scale assessment purposes.

Components of the item specifications include:

Expectation Unwrapped breaks down a list of clearly delineated content and skills the students are expected to know and be able to do upon mastery of the Expectation.

Depth of Knowledge (DOK) Ceiling indicates the highest level of cognitive complexity that would typically be assessed on a large scale assessment. The DOK ceiling is not intended to limit the complexity one might reach in classroom instruction.

Item Format indicates the types of items used in large scale assessment. For each expectation, the item format specifies the type best suited for that particular expectation.

Text Types suggests a broad list of text types for both literary and informational expectations. This list is not intended to be all inclusive: other text types may be used in the classroom setting. The expectations were written in grade level bands; for this reason, the progression of the expectations relies upon increasing levels of quantitative and qualitative text

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complexities.

Content Limits/Assessment Boundaries are parameters that item writers should consider when developing a large scale assessment. For example, some expectations should not be assessed on a large scale assessment but are better suited for local assessment.

Sample stems are examples that address the specific elements of each expectation and address varying DOK levels. The sample stems provided in this document are in no way intended to limit the depth and breadth of possible item stems. The expectation should be assessed in a variety of ways.

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Frequently asked questions for Item Specification and Sample Stems

1. What is the purpose of the Item Specification document?

Historically, Item Specification documents are written for test item writers. In Missouri, this document was seen as a resource for not only item writers, but teachers as well. The unwrapped section should provide more detail on the meaning of the standard and the sample stems should provide example items that also help clarify the standard. In this update, the language used in the Expanded Expectations document was included to merge the two documents for easier access. In some standards a “Notes” section was added to provide additional information.

2. Why do some unwrapped sections have the same few sentences at the beginning?

For standards that have multiple parts and are listed as sub expectations, e.g., NF.C.5.b, the first part highlights the intent of that standard series. Often, these standards should be taught together as they develop a bigger idea or concept.

3. Why is the Fluency definition only on some standards?

Certainly, students having experience using different strategies and picking the strategy they feel best for given situations is important to improving student knowledge in mathematics. The Missouri Educators working on the document felt it important to highlight areas where student access to multiple strategies would provide the greatest support. Listing fluency in all standards would likely lessen the impact needed.

4. What does the “e.g.” mean when listed in the unwrapped section?

The “e.g.” is a way to highlight a list of examples, ideas, or concepts. It is **not** an exhaustive list, nor is it intended to represent the best examples. It is merely a partial list to provide some examples.

5. What does “with or without context” mean?

This phrase was used to highlight that the math problems might have some situational context or could possibly be a strictly number or symbol situation. The Educators working on this update wanted the focus to be on using math to solve problem situations rather than a focus on “real world” problems.

6. Are the Sample Stems examples of summative test items?

The Sample Stems could be a classroom item or possibly an assessment item. In some cases, the problem used would have to be adjusted to use on a Statewide assessment. The goal was to give students and teachers a problem that aligns to the standard. The Stems provided in the document are an example. The educators assisting with the update in some cases created more than one example and those are listed at the bottom of the document. All examples are good, some fit better on the page within the Item Specification which have determined those shown in both places.

7. Why are there no answers listed with the Sample Stems?

The focus of the Sample Stems should be on the work students can demonstrate to indicate their level of understanding for the given standard. While the answer is one component, when given, it frequently becomes the focus which does not provide important information in the learning process.

8. What does “No Limits” mean in the Limits and Boundaries section?

Where there are no limits or boundaries to be listed, “No Limits” was used to indicate this situation and help those using the document understand that it wasn’t an oversight. IMPORTANT NOTE: if the standard itself or the cluster heading lists a specific limit, e.g., specific denominators, size or type of number, that was not duplicated in the Limits section.

9. Why do some words show a short definition?

While this does not serve as a replacement for a glossary, there were terms within the unwrapping that the committee felt should have meaning included. This occurs in the standard where it specifically addresses the concept in the standard, e.g., cardinality, trapezoid.

10. Why are Kindergarten and Grade 1 Sample Stems a bit different?

Students in Kindergarten and Grade 1 are beginning readers, so teachers should expect to read problems to the students rather than only providing problems to be solved.

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Mathematics		8.NS.A.1.a
NS	Number Sense and Operations	
A	Know that there are numbers that are not rational, and approximate them by rational numbers.	
1	Explore the real number system.	
a	Know the differences between rational and irrational numbers.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.NS.A.1 (a through d) indicate how eighth-grade students will explore the real number system.</p> <p>The student will know the differences between rational and irrational numbers.</p> <p>The student will recognize that all rational numbers can be written as a quotient of two integers with the denominator not equal to zero, e.g., $\frac{a}{b}$ with a and b integers and b not equal to 0.</p> <p>The student will recognize that all irrational numbers cannot be written as a quotient of two integers but can be written as a decimal that does not repeat or terminate.</p>		<p><u>Sample Stems</u></p> <p>Given these numbers, which are rational numbers? Explain how you know that a number is rational.</p> <p> $\sqrt{2}$ $\sqrt{4}$ $\sqrt{25}$ 7.43 $\frac{1}{3}$ π $\sqrt{\frac{3}{2}}$ </p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Limit radicals to square roots.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling: 3</u>		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

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Mathematics		8.NS.A.1.b
NS	Number Sense and Operations	
A	Know that there are numbers that are not rational, and approximate them by rational numbers.	
1	Explore the real number system.	
b	Understand that all rational numbers have a decimal expansion that terminates or repeats.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.NS.A.1 (a through d) indicate how eighth-grade students will explore the real number system.</p> <p>The student will understand that all rational numbers have a decimal expansion that terminates or repeats.</p>		<p><u>Sample Stems</u></p> <p>Explain why $\frac{1}{3}$ is a rational number and why pi is not.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
DOK Ceiling: 3		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.NS.A.1.c
NS	Number Sense and Operations	
A	Know that there are numbers that are not rational, and approximate them by rational numbers.	
1	Explore the real number system.	
c	Convert decimals which repeat into fractions and fractions into repeating decimals.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.NS.A.1 (a through d) indicate how eighth-grade students will explore the real number system.</p> <p>The student will convert decimals which repeat into fractions and fractions into repeating decimals.</p>		<p><u>Sample Stems</u></p> <p>Convert the following fraction into its decimal equivalent. $\frac{7}{111}$</p> <p>Convert the following decimal into its rational equivalent. $0.\overline{123}$</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.NS.A.1.d
NS	Number Sense and Operations	
A	Know that there are numbers that are not rational, and approximate them by rational numbers.	
1	Explore the real number system.	
d	Generate equivalent representations of rational numbers.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.NS.A.1 (a through d) indicate how eighth-grade students will explore the real number system.</p> <p>The student will generate equivalent representations of rational numbers (fractions, decimals, and percentages).</p>		<p><u>Sample Stems</u></p> <p>Identify equivalent representations (fractions, decimals, or percentages) to the following rational numbers.</p> <p> $\frac{2}{9}$ $\frac{5}{6}$ 25% $\frac{5}{4}$ $\frac{45}{7}$ </p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
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Mathematics		8.NS.A.2
NS	Number Sense and Operations	
A	Know that there are numbers that are not rational, and approximate them by rational numbers.	
2	Estimate the value and compare the size of irrational numbers and approximate their locations on a number line.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The student will estimate the value and compare the size (magnitude) of irrational numbers and approximate their locations on a number line, e.g., π, $\sqrt{2}$, $\sqrt{3}$, $\sqrt[3]{28}$, etc.</p>		<p><u>Sample Stems</u></p> <p>Estimate the value and compare the size of irrational numbers and approximate their locations on a number line.</p> <p>$\sqrt{3}$ $\sqrt{8}$ $\sqrt{30}$</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<p><u>DOK Ceiling:</u> 3</p>		
<p><u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced</p>		

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Mathematics		8.EE1.A.1
EE1	Expressions, Equations and Inequalities	PRIORITY STANDARD
A	Work with radicals and integer exponents.	
1	Know and apply the properties of integer exponents to generate equivalent expressions.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The student will know and apply the properties of integer exponents to generate equivalent numerical expressions including expressions with more than one operation.</p> <p>Note: The focus of this standard is students understanding the properties of integer exponents, not memorizing these properties in expressions. Generally, when working with exponents, the base is not equal to zero and zero to the power of zero is undefined.</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an appropriate strategy in a reasonable amount of time, knowing multiple processes and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context involving properties of integer exponents generating equivalent expressions.</p>		<p><u>Sample Stems</u></p> <p>Rewrite an equivalent expression by using the multiplicative inverse for any bases with negative exponents.</p> $3^{-7} * 3^4$ <p>Which operation, x or ÷, would create the largest solution for the following expression.</p> $4^{\square} \bigcirc 4^{\square}$ <p>Explain your answer using mathematical work and reasoning. How would the values used for exponents impact this problem?</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.EE1.A.2.a
EE1	Expressions, Equations and Inequalities	
A	Work with radicals and integer exponents.	
2	Investigate concepts of square and cube roots.	
a	Solve equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE1.A.2 (a through c) indicate how eighth-grade students will investigate concepts of square and cube roots, e.g., $x^2 = 16$; $x = \pm\sqrt{16}$ or $x = \pm 4$; ; $x^2 = 8$; $x = \pm\sqrt{8}$ or $x = \pm 2\sqrt{2}$; $x^3 = 27$; $x = \sqrt[3]{27}$ or $x = 3$.</p> <p>The student will use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. The unknown can be on either side of the equation.</p> <p>Note: When taking the square root of a number we generally show the solution as the principal root, e.g., positive root. The square root of 16 is 4. When solving an equation with squares, the solution should include both positive and negative roots as shown above.</p>		<p><u>Sample Stems</u></p> <p>Given a cube with volume of 512 cubic centimeters, make an equation that represents this situation using x to represent the cube’s side length. Solve your equation for x.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<p><u>DOK Ceiling:</u> 3</p>		
<p><u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced</p>		

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Mathematics		8.EE1.A.2.b
EEI	Expressions, Equations and Inequalities	
A	Work with radicals and integer exponents.	
2	Investigate concepts of square and cube roots.	
b	Evaluate square roots of perfect squares less than or equal to 625 and cube roots of perfect cubes less than or equal to 1000.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE1.A.2 (a through c) indicate how eighth-grade students will investigate concepts of square and cube roots.</p> <p>The student will evaluate square roots of perfect squares less than or equal to 625 and cube roots of perfect cubes less than or equal to 1000. While many resources will describe perfect squares, or cubes, only apply to integers, students need to recognize that some rational numbers can be squares or cubes. Some examples to consider would be $\sqrt{.36}$, $\sqrt{\frac{36}{100}}$, or $\sqrt{6.25}$.</p> <p>Note: When taking the square root of a number we generally show the solution as the principal root, e.g., positive root. The square root of 16 is 4. When solving an equation with squares, the solution should include both positive and negative roots.</p>		<p><u>Sample Stems</u></p> <p>A student finds the square root of 100 and 400. They wonder why these have rational square roots, but 200 and 300 do not. Compare these numbers and describe what is similar and different between them.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.EE1.A.2.c
EEI	Expressions, Equations and Inequalities	
A	Work with radicals and integer exponents.	
2	Investigate concepts of square and cube roots.	
c	Recognize that square roots of non-perfect squares are irrational.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE1.A.2 (a through c) indicate how eighth-grade students will investigate concepts of square and cube roots.</p> <p>The student will recognize that square roots of non-perfect squares are irrational.</p> <p>The student will explain why numbers are or are not perfect squares.</p>		<p><u>Sample Stems</u></p> <p>Show the result of the square root of the numbers listed below and verify the results by showing a model of the square root.</p> <p style="text-align: center;"> $\frac{1}{25}$ 25 </p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

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Mathematics		8.EE1.A.3
EE1 A 3	Expressions, Equations and Inequalities Work with radicals and integer exponents. Express very large and very small quantities in scientific notation and approximate how many times larger one is than the other.	
<u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u> The student will use scientific notation, with or without context, to express very large and very small quantities. Students will understand that a number multiplied by a base of ten raised to a positive exponent will result in a larger number than the original factor and that a number multiplied by a base of ten raised to a negative exponent will result in a smaller number than the original factor. The student will compare numbers in scientific notation, with or without context, by approximating how many times larger one is than the other.		<u>Sample Stems</u> The population of another country is almost four times larger than the population of the US. If this country’s population is 101.44×10^9 , what is the approximate population of the US? <

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Mathematics		8.EE1.A.4.a
EE1	Expressions, Equations and Inequalities	
A	Work with radicals and integer exponents.	
4	Use scientific notation to solve problems.	
a	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE1.A.4 (a and b) indicate how eighth-grade students will use scientific notation to solve problems with or without context.</p> <p>The student will perform operations with numbers expressed in scientific notation, with or without context, including problems where both decimal and scientific notation are used.</p>		<p><u>Sample Stems</u></p> <p>In 2020, the US population was 331.5 million and the population of Iceland was 900 times smaller. What is the population of Iceland?</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Focus should be on multiplication and division and less on addition/subtraction.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

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Mathematics		8.EE1.A.4.b
EEI	Expressions, Equations and Inequalities	
A	Work with radicals and integer exponents.	
4	Use scientific notation to solve problems.	
b	Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE1.A.4 (a and b) indicate how eighth-grade students will use scientific notation to solve problems with or without context.</p> <p>The student will use scientific notation to represent measurements of very large or very small quantities in context and explain the appropriateness of the unit selected.</p> <p>The student will use technology to interpret problems involving very large or very small quantities.</p>		<p><u>Sample Stems</u></p> <p>The African Plate and the Eurasian Plate are converging, and the African Plate is moving north at an average rate of 2.7 centimeters per year relative to the Eurasian Plate. Convert this rate of tectonic plate movement into scientific notation, expressing the answer in millimeters per year.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

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Mathematics		8.EE1.B.5.a
EEI	Expressions, Equations and Inequalities	
B	Understand the connections between proportional relationships, lines and linear equations.	
5	Graph proportional relationships.	
a	Interpret the unit rate as the slope of the graph.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE1.B.5 (a and b) indicate how eighth-grade students will graph proportional relationships.</p> <p>The student will describe the unit rate as the constant of proportionality, which will also be the slope of the graph.</p> <p>Note: Students should recognize that comparing two variables could generate two different unit rates depending on which variable is identified as the independent variable and which is the dependent variable.</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an appropriate strategy in a reasonable amount of time, knowing multiple processes and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context to interpret unit rates as the slope of a linear graph.</p>		<p><u>Sample Stems</u></p> <p>Every 20 seconds an escalator step rises 12 feet. Draw a graph of the situation. Find the unit rate.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
DOK Ceiling: 3		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

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Mathematics		8.EE1.B.5.b
EEI	Expressions, Equations and Inequalities	
B	Understand the connections between proportional relationships, lines and linear equations.	
5	Graph proportional relationships.	
b	Compare two different proportional relationships.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE1.B.5 (a and b) indicate how eighth-grade students will graph proportional relationships.</p> <p>The student will describe the similarities and differences between two different proportional relationships.</p>		<p><u>Sample Stems</u></p> <p>Audrey and Aaron have summer jobs stuffing envelopes for two different companies. Audrey earns \$12 for every 400 envelopes she finishes. Aaron earns \$6 for every 300 envelopes he finishes.</p> <p>Model these two proportional relationships using graphs, models, equations, or other representations to so each person’s earnings.</p> <p>Use those representations to compare each person’s earnings after stuffing the same number of envelopes? Be sure to include how the model represents your conclusions.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
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Mathematics		8.EE.B.6.a
EEI	Expressions, Equations and Inequalities	PRIORITY STANDARD
B	Understand the connections between proportional relationships, lines and linear equations.	
6	Apply concepts of slope and y-intercept to graphs, equations and proportional relationships.	
a	Explain why the slope (m) is the same between any two distinct points on a non-vertical line in the Cartesian coordinate plane.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE.B.6 (a and b) indicate how eighth-grade students will apply concepts of slope and y-intercept to graphs, equations, and proportional relationships with or without context.</p> <p>The student will explain why the slope, m, (rate of change) is the same between any two distinct points on a non-vertical line in the Cartesian coordinate plane.</p> <p>Note: In grade 8, the goal would be for student explanations to include how the rate of the change in vertical distance compared to the change in horizontal distance remains constant and that the points are on the same line.</p>		<p><u>Sample Stems</u></p> <p>The ADA (Americans with Disabilities Act) states that ramps may have a maximum slope of 1:12.</p> <p>Explain whether the slope of the incline, represented on a cartesian plane, through (0,0) and (1,12) could be the same as the slope of the line through points (1,12) and (3, 36).</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
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Grade 8 Mathematics

Mathematics		8.EE1.B.6.b
EE1	Expressions, Equations and Inequalities	PRIORITY STANDARD
B	Understand the connections between proportional relationships, lines and linear equations.	
6	Apply concepts of slope and y-intercept to graphs, equations and proportional relationships.	
b	Derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b .	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE1.B.6 (a and b) indicate how eighth-grade students will apply concepts of slope and y-intercept to graphs, equations, and proportional relationships with or without context.</p> <p>The student will generate (derive) an equation in slope-intercept form when given the slope (m) and a point on the line or other attributes, e.g., lines through the origin, intersecting the vertical axis at b (y-intercept), a table of values, two points on a line, or a linear graph for problems with or without context.</p>		<p><u>Sample Stems</u></p> <p>Jenny goes to a fair with \$40 to spend on rides. Each ride costs Jenny \$5. Write an equation in slope intercept form to represent Jenny’s situation showing the relationship between the amount of money Jenny has and the number of rides she takes.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>When writing the equation from a graph, all necessary information should be easily identifiable on intersecting grid lines.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.EE1.C.7.a
EE1	Expressions, Equations and Inequalities	PRIORITY STANDARD
C	Analyze and solve linear equations and inequalities and pairs of simultaneous linear equations.	
7	Solve linear equations and inequalities in one variable.	
a	Create and identify linear equations with one solution, infinitely many solutions or no solutions.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE1.C.7 (a and b) indicate how eighth-grade students will solve linear equations and inequalities in one variable. This can include variables on both sides.</p> <p>The student will identify the number of solutions of a linear equation and create examples of linear equations with one solution, infinitely many solutions, or no solutions.</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an <u>appropriate strategy</u> in a reasonable amount of time, <u>knowing multiple processes</u> and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context to create and identify linear equations with one solution, infinitely many solutions, or no solutions.</p>		<p><u>Sample Stems</u></p> <p>Add a value to the equation below to create an equation with no solutions.</p> $-4x + 4 = ______ x + 2$ <p>Without solving the problem, how can you tell if an equation will have 0, 1, or infinite solutions?</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
DOK Ceiling: 3		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.EE.C.7.b
EEI	Expressions, Equations and Inequalities	PRIORITY STANDARD
C	Analyze and solve linear equations and inequalities and pairs of simultaneous linear equations.	
7	Solve linear equations and inequalities in one variable.	
b	Solve linear equations and inequalities with rational number coefficients, including equations and inequalities whose solutions require expanding expressions using the distributive property and combining like terms.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE.C.7 (a and b) indicate how eighth-grade students will solve linear equations and inequalities in one variable. This can include variables on both sides.</p> <p>The student will solve linear equations and inequalities with rational number coefficients, including equations and inequalities whose solutions require expanding expressions using the distributive property and combining like terms.</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an <u>appropriate strategy</u> in a reasonable amount of time, <u>knowing multiple processes</u> and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context to solve linear equations and inequalities with rational number coefficients.</p>		<p><u>Sample Stems</u></p> <p>Using the two equations below, describe the similarities and differences for solving each.</p> $\frac{4m - 7}{3} = 7$ $\frac{4m - 7}{3} = 7m$ <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.EE.C.8.a
EEI	Expressions, Equations and Inequalities	PRIORITY STANDARD
C	Analyze and solve linear equations and inequalities and pairs of simultaneous linear equations.	
8	Analyze and solve systems of linear equations.	
a	Graph systems of linear equations and recognize the intersection as the solution to the system.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE.C.8 (a through d) indicate how eighth-grade students will analyze and solve systems of linear equations, with or without context.</p> <p>The student will graph systems of linear equations and recognize the approximation of their intersection as the solution to the system.</p>		<p><u>Sample Stems</u></p> <p>Two lines intersect at (6,2). Where else will they intersect? How do you know?</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>The y-intercept should be easily identifiable on intersecting grid lines. Limited to only two equations, both in slope-intercept form.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.EE1.C.8.b
EEI	Expressions, Equations and Inequalities	PRIORITY STANDARD
C	Analyze and solve linear equations and inequalities and pairs of simultaneous linear equations.	
8	Analyze and solve systems of linear equations.	
b	Explain why solution(s) to a system of two linear equations in two variables correspond to point(s) of intersection of the graphs.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE1.C.8 (a through d) indicate how eighth-grade students will analyze and solve systems of linear equations, with or without context.</p> <p>The student will explain why solution(s) to a system of two linear equations in two variables correspond to point(s) of intersection of their graphs.</p> <p>The student will explain that point(s) of intersection(s) are solution(s) to both equations in the system.</p>		<p><u>Sample Stems</u></p> <p>Alex is in town for 4 weeks to take a class. He wants to join a gym while in town. Which deal is the best one?</p> <ul style="list-style-type: none"> • OPTION A: Pay \$14/week • OPTION B: Pay \$48 membership and \$2/week <p>If his class is extended for one extra week, explain how this might affect your answer?</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Limited to two equations.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
DOK Ceiling: 3		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

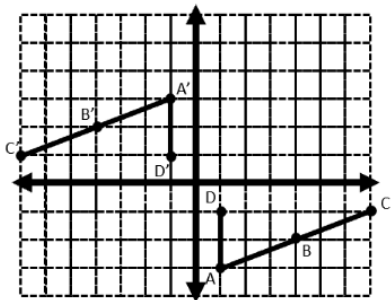
Grade 8 Mathematics

Mathematics		8.EEI.C.8.c
EEI	Expressions, Equations and Inequalities	PRIORITY STANDARD
C	Analyze and solve linear equations and inequalities and pairs of simultaneous linear equations.	
8	Analyze and solve systems of linear equations.	
c	Explain why systems of linear equations can have one solution, no solution or infinitely many solutions.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EEI.C.8 (a through d) indicate how eighth-grade students will analyze and solve systems of linear equations, with or without context.</p> <p>The student will explain why systems of linear equations can have one solution, no solution, or infinitely many solutions when the system is presented in various representations, e.g. graphical, verbal, or algebraic.</p> <p>The student will determine the number of solutions using a graph, slopes, and/or y-intercepts, or solving the system algebraically.</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an appropriate strategy in a reasonable amount of time, knowing multiple processes and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context to clarify why systems of linear equations can have one solution, no solution, or infinitely many solutions.</p>		<p><u>Sample Stems</u></p> <p>Given the following system, what would the values of Q and P need to be for each of these situations: An infinite number of solutions, one solution, and no solutions. Explain your choices.</p> $y = 3x + 8 \text{ and } y = Qx + P$ <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Limited to two representations of the same type, e.g., graphical, verbal, or algebraic.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
DOK Ceiling: 3		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

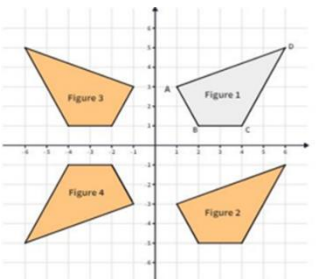
Grade 8 Mathematics

Mathematics		8.EE.C.8.d
EEI	Expressions, Equations and Inequalities	PRIORITY STANDARD
C	Analyze and solve linear equations and inequalities and pairs of simultaneous linear equations.	
8	Analyze and solve systems of linear equations.	
d	Solve systems of two linear equations.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.EE.C.8 (a through d) indicate how eighth-grade students will analyze and solve systems of linear equations, with or without context.</p> <p>The student will solve systems of two linear equations in two variables algebraically, including methods of substitution and elimination or through inspection.</p> <p>The student will solve problems with or without context leading to two linear equations in two variables.</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an appropriate strategy in a reasonable amount of time, knowing multiple processes and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context to solve systems of two linear equations.</p>		<p><u>Sample Stems</u></p> <p>The local bowling alley is making a special offer. They usually charge \$3.50 per day to bowl. This month bowlers can pay an enrollment fee of \$15 and then the daily pass will only be \$2 per day.</p> <p>Create two linear equations to represent this situation and solve this system of equations. Given the context of this situation, what will the solution represent?</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>If using elimination, limited to multiplying one of the equations by a constant, not both.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.GM.A.1.a
GM	Geometry and Measurement	
A	Understand congruence and similarity using physical models, transparencies or geometry software.	
1	Verify experimentally the congruence properties of rigid transformations.	
a	Verify that angle measure, betweenness, collinearity and distance are preserved under rigid transformations.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.GM.A.1 (a and b) indicate how eighth-grade students will verify experimentally the congruence properties of rigid transformations (rotations about the origin, reflections, and translations).</p> <p>The student will verify that betweenness (the distance that point b is between point a and point c), collinearity (points on the same line), and distance are preserved under rigid transformations.</p> <p>The student will verify that lines are mapped to lines, including parallel lines.</p> <p>The student will verify that corresponding angles and line segments are congruent.</p>		<p><u>Sample Stems</u></p> <p>Alex does not believe that angle A'B'C' has been rotated 180 degrees about the origin and is the image of Angle ABC. What can you share with Alex to convince him that this is true?</p>  <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Limited to one rigid transformation.</p> <p>Limit rotations about the origin to 90°, 180°, 270°.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<p><u>DOK Ceiling:</u> 3</p>		
<p><u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced</p>		

Grade 8 Mathematics

Mathematics		8.GM.A.1.b
GM	Geometry and Measurement	
A	Understand congruence and similarity using physical models, transparencies or geometry software.	
1	Verify experimentally the congruence properties of rigid transformations.	
b	Investigate if orientation is preserved under rigid transformations.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.GM.A.1 (a and b) indicate how eighth-grade students will verify experimentally the congruence properties of rigid transformations (rotations about the origin, reflections, and translations).</p> <p>The student will investigate if orientation (order of points) is preserved under rigid transformations.</p>		<p><u>Sample Stems</u></p> <p>Figure 1 has been transformed into each of the other figures shown below. Identify what transformations were used for each figure and describe how the transformation affected the order of the figure's points.</p>  <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Limited to one rigid transformation. Limit rotations about the origin to 90°, 180°, 270°.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
DOK Ceiling: 2		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

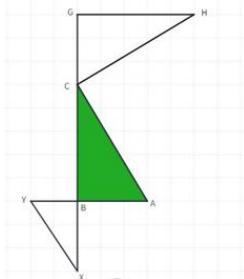
Grade 8 Mathematics

Mathematics		8.GM.A.2.a
GM	Geometry and Measurement	
A	Understand congruence and similarity using physical models, transparencies or geometry software.	
2	Understand that two-dimensional figures are congruent if a series of rigid transformations can be performed to map the pre-image to the image.	
a	Describe a possible sequence of rigid transformations between two congruent figures.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.GM.A.2 indicate how eighth-grade students will understand that two-dimensional figures are congruent if a series of rigid transformations (rotations about the origin, reflections, translations) can be performed to map the pre-image to the image.</p> <p>The student will describe a sequence of transformations that justifies the congruence between two congruent figures.</p>		<p><u>Sample Stems</u></p> <p>Given the figure below, identify which triangle is congruent to triangle ABC. Be sure to indicate the transformation used to generate the congruent triangle and how you know they must be congruent.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Limited to no more than two rigid transformations.</p> <p>Vertices of the original figure are located in the same quadrant, including the axes.</p> <p>Limit rotations about the origin to 90°, 180°, 270°.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

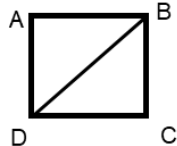
Grade 8 Mathematics

Mathematics		8.GM.A.3
GM	Geometry and Measurement	PRIORITY STANDARD
A	Understand congruence and similarity using physical models, transparencies or geometry software.	
3	Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The student will describe the effect of dilations centered at the origin, translations, rotations about the origin, and reflections on two-dimensional figures using coordinates.</p>		<p><u>Sample Stems</u></p> <p>The following points are graphed on a coordinate graph: A(0,0), B(3,3), and C(2,0). ABC is dilated by a scale factor of 2, rotated clockwise 90 degrees about the origin then translated up 4 units. Which transformation moved the entire shape to another quadrant? Which transformation changed only one of the coordinates of each of the vertices?</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Limited to two-dimensional figures with no more than six coordinates. Limit reflections to across the x or y axis. Limit rotations about the origin to 90°, 180°, 270°. Limited to one transformation.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

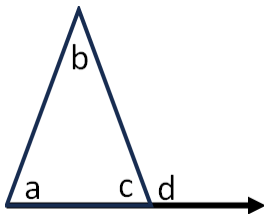
Grade 8 Mathematics

Mathematics		8.GM.A.4.a
GM	Geometry and Measurement	
A	Understand congruence and similarity using physical models, transparencies or geometry software.	
4	Understand that two-dimensional figures are similar if a series of transformations (rotations, reflections, translations and dilations) can be performed to map the pre-image to the image.	
a	Describe a possible sequence of transformations between two similar figures.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.GM.A.4 indicate how eighth-grade students will understand that two-dimensional figures are similar if a series of transformations (rotations about the origin, reflections, translations, and dilations centered at the origin) can be performed to map the pre-image to the image.</p> <p>The student will describe a possible sequence of transformations that justifies the similarity between them.</p>		<p><u>Sample Stems</u></p> <p>Given the figure below, identify which triangle is similar to triangle ABC. Be sure to indicate the transformation used to generate the similar triangle and how you know they must be congruent.</p>  <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Limited to no more than two transformations.</p> <p>Limited to two-dimensional figures with no more than six coordinates.</p> <p>Limit reflections to across the x or y axis.</p> <p>Limit rotations about the origin to 90°, 180°, 270°.</p> <p>Dilations should be centered at the origin.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.GM.A.5.a
GM	Geometry and Measurement	
A	Understand congruence and similarity using physical models, transparencies or geometry software.	
5	Explore angle relationships and establish informal arguments.	
a	Derive the sum of the interior angles of a triangle.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.GM.A.5 (a through d) indicate how eighth-grade students will explore angle relationships and establish informal arguments.</p> <p>The student will establish informal arguments, e.g., written or example justification not the formal language of a proof, to derive the sum of the interior angles of a triangle.</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an <i>appropriate strategy</i> in a reasonable amount of time, <i>knowing multiple processes</i> and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context to derive the sum of the interior angles of a triangle.</p>		<p><u>Sample Stems</u></p> <p>Use the square below to explain how you can find the sum of the measures of triangle ABC.</p> <div></div> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<p><u>DOK Ceiling:</u> 3</p>		
<p><u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced</p>		

Grade 8 Mathematics

Mathematics		8.GM.A.5.b
GM	Geometry and Measurement	
A	Understand congruence and similarity using physical models, transparencies or geometry software.	
5	Explore angle relationships and establish informal arguments.	
b	Explore the relationship between the interior and exterior angles of a triangle.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.GM.A.5 (a through d) indicate how eighth-grade students will explore angle relationships and establish informal arguments.</p> <p>The student will explore and establish informal arguments about the relationship between the interior and exterior angles of a triangle, e.g., the exterior angle is equal to the sum of the opposite interior angles, adjacent interior and exterior angles are supplementary.</p>		<p><u>Sample Stems</u></p> <p>The figure below contains an isosceles triangle with one side extending beyond. If angle a is 60°, what can be determined about the other angles?</p>  <p>Explain how you know that these angles are correct, given angle a.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<p><u>DOK Ceiling:</u> 3</p>		
<p><u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced</p>		

Grade 8 Mathematics

Mathematics		8.GM.A.5.c
GM	Geometry and Measurement	
A	Understand congruence and similarity using physical models, transparencies or geometry software.	
5	Explore angle relationships and establish informal arguments.	
c	Construct and explore the angles created when parallel lines are cut by a transversal.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.GM.A.5 (a through d) indicate how eighth-grade students will explore angle relationships and establish informal arguments.</p> <p>The student will construct and explore to establish informal arguments about the angles created when parallel lines are cut by a transversal which include: alternate interior angles, alternate exterior angles, corresponding angles, same side interior angles/consecutive interior angles, vertical angles.</p> <p>Since formal construction is a part of the standards in the course of Geometry, construction in 8th grade would have students draw or use manipulatives to explore the angle relationships when parallel lines are cut by a transversal.</p>		<p><u>Sample Stems</u></p> <p>Draw or create a rectangle with a line drawn through opposite vertices. Explain how this drawing models two parallel lines cut by a transversal.</p> <p>Use your representation to describe what you know about all the angles created. Be sure to label the angles discussed and include the following concepts: alternate interior angles, alternate exterior angles, corresponding angles, same side interior angles/consecutive interior angles, vertical angles.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.GM.A.5.d
GM	Geometry and Measurement	
A	Understand congruence and similarity using physical models, transparencies or geometry software.	
5	Explore angle relationships and establish informal arguments.	
d	Use the properties of similar figures to solve problems.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.GM.A.5 (a through d) indicate how eighth-grade students will explore angle relationships and establish informal arguments.</p> <p>The student will establish informal arguments and solve problems using properties of similar figures, e.g., corresponding angles are congruent, corresponding sides are proportional.</p>		<p><u>Sample Stems</u></p> <p>Polly is thinking about similar figures and shapes. She believes that any square will be similar to all larger squares. However, she does not believe that any parallelogram (that isn’t a square) will be similar to all larger parallelograms.</p> <p>Use properties of similar figures to explain whether Polly is correct or not.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

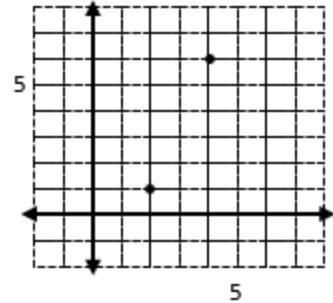
Grade 8 Mathematics

Mathematics		8.GM.B.6
GM	Geometry and Measurement	PRIORITY STANDARD
B	Understand and apply the Pythagorean Theorem	
6	Use models to demonstrate a proof of the Pythagorean Theorem and its converse.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The student will use models, e.g., pictorial, graphic, or equations, to demonstrate a proof of the Pythagorean Theorem and its converse.</p> <p>The student will use the Pythagorean Theorem to prove when three lengths can make a right triangle.</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an <u>appropriate strategy</u> in a reasonable amount of time, <u>knowing multiple processes</u> and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context to model and demonstrate the Pythagorean Theorem and its converse.</p>		<p><u>Sample Stems</u></p> <p>Given a right triangle with side lengths 3, 4, and 5, demonstrate that the Pythagorean Theorem is true. Support your answer using shapes scaled to each side length, e.g., squares, semi-circles.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.GM.B.7
GM	Geometry and Measurement	
B	Understand and apply the Pythagorean Theorem	
7	Use the Pythagorean Theorem to determine unknown side lengths in right triangles in problems in two- and three-dimensional contexts.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The student will use the Pythagorean Theorem to determine unknown side lengths in right triangles, with or without context, in two and three dimensions.</p>		<p><u>Sample Stems</u></p> <p>The standard doorway into a house is 36 inches by 80 inches. The newly purchased sofa is too wide (40 inches) to get through the door right side up and too long (84 inches) to get through the door if stood on its side. Will the sofa fit through the door diagonally? How do you know?</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Answers do not have to be in simplest form.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.GM.B.8
GM	Geometry and Measurement	
B	Understand and apply the Pythagorean Theorem	
8	Use the Pythagorean Theorem to find the distance between points in a Cartesian coordinate system.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The student will use the Pythagorean Theorem to find the distance between two points in a coordinate system.</p> <p>In 8th grade the student will informally develop this relationship since the distance formula is formalized in the course of Geometry.</p>		<p><u>Sample Stems</u></p> <p>Use the Pythagorean Theorem to find the distance between the two coordinates shown in the graph below.</p>  <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Answers do not have to be in simplest form.</p> <p>Points should clearly fall on intersections of the coordinate grid lines.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
DOK Ceiling: 3		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.GM.C.9.a
GM	Geometry and Measurement	PRIORITY STANDARD
C	Solve problems involving volume of cones, pyramids and spheres.	
9	Solve problems involving surface area and volume.	
a	Understand the concept of surface area and find the surface area of pyramids.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.GM.C.9 (a and b) indicate how eighth-grade students will use the relationship between area and surface area to solve problems with or without context.</p> <p>The student will apply the concept of area to find the surface area of pyramids (triangular and rectangular), including slant height.</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an <u>appropriate strategy</u> in a reasonable amount of time, <u>knowing multiple processes</u> and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context to demonstrate the concept of surface area and find the surface area of pyramids.</p>		<p><u>Sample Stems</u></p> <p>Compare the surface area for two rectangular pyramids. Both have a pyramid height of 10, one has a square base (side length 5), and the other has a rectangular base (side lengths 4 by 6). Support your comparison using words, equations, models, or other strategies.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Pyramids will have a triangular or rectangular base.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
DOK Ceiling: 3		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.GM.C.9.b
GM	Geometry and Measurement	PRIORITY STANDARD
C	Solve problems involving volume of cones, pyramids and spheres.	
9	Solve problems involving surface area and volume.	
b	Understand the concepts of volume and find the volume of pyramids, cones and spheres.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.GM.C.9 (a and b) indicate how eighth-grade students will use the relationship between area and surface area to solve problems with or without context.</p> <p>The student will demonstrate an understanding of the concept of volume, e.g., capacity and cubic units of measurement.</p> <p>The student will find the relationships and solve problems among right pyramids (triangular and rectangular), right cones and spheres, e.g., using models, verbal descriptions, and the difference between slant height and height (altitude).</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an appropriate strategy in a reasonable amount of time, knowing multiple processes and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context to demonstrate the concept of volume and find the volume of pyramids, cones, and spheres.</p>		<p><u>Sample Stems</u></p> <p>Compare the volume for these 3 figures. A pyramid height of 10 with a square base (side length 5); a cone with a base having a diameter of 5 and a height of 10; and a sphere with radius of 5. Support your comparison using words, equations, models, or other strategies.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Will not have composite figures.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
DOK Ceiling: 3		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

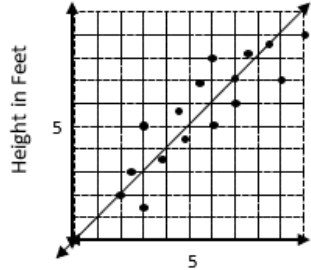
Grade 8 Mathematics

[illegible]

Grade 8 Mathematics

Mathematics		8.DSP.A.2
DSP	Data Analysis, Statistics and Probability	
A	Investigate patterns of association in bivariate data.	
2	Generate and use a trend line for bivariate data, and informally assess the fit of the line.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The student will know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally find a line of best fit and informally assess the fit of the line (strength and weakness) by evaluating the closeness of the data points to the line.</p> <p>The student will understand that trend lines do not have to start at the origin and may not pass through all data points.</p> <p>The student will write an equation for a given line of best fit.</p>		<p><u>Sample Stems</u></p> <p>Using the data shown in the graph below, Tim has used the coordinates (8, 2) and (3, 7) to make a trend line as his best fit. Find the equation using Tim’s coordinates and evaluate the fit of the selected line.</p> <p>Describe any line that would seem to be a better fit given this data.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>On the graph the y-intercept and at least two coordinate pairs must clearly fall on intersections of the coordinate grid lines when writing the equation of the given line of best fit.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.DSP.A.3
DSP	Data Analysis, Statistics and Probability	PRIORITY STANDARD
A	Investigate patterns of association in bivariate data.	
3	Interpret the parameters of a linear model of bivariate measurement data to solve problems.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The student will use the given equation or graph of a linear model to solve problems, with or without context of bivariate measurement data, interpreting the parameters (slope/rate of change and y-intercept.)</p> <p>The student will use the linear model to make predictions, within and beyond the given set of data.</p> <p>A linear model is a situation that can be represented by a linear equation, table, and/or graph. Bivariate data is given in two variables in which one variable has a corresponding data point in the other value. For example, the student will interpret a slope/rate of change of 1.5 mm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 mm in mature plant height.</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an appropriate strategy in a reasonable amount of time, knowing multiple processes and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context to interpret the parameters of a linear model of bivariate measurement data to solve problems.</p>		<p><u>Sample Stems</u></p> <p>The graph below shows the height of a variety of sunflower plants after weeks of growth. Use the parameters of the given line of best fit to describe the given situation and predict the expected height at 6 weeks after planting.</p>  <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Limit the coordinate grid to only the first quadrant.</p> <p>Limit the data set to ten ordered pairs, if the graph is not given.</p> <p>On the graph, the y-intercept and at least two coordinate pairs must clearly fall on intersections of the coordinate grid lines.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
DOK Ceiling: 3		
Item Format: Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.DSP.A.4.a									
DSP	Data Analysis, Statistics and Probability	PRIORITY STANDARD									
A	Investigate patterns of association in bivariate data.										
4	Understand the patterns of association in bivariate categorical data displayed in a two-way table.										
a	Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects.										
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.DSP.A.4 (a and b) indicate how eighth-grade students will understand that patterns of association can also be seen in bivariate categorical data in a two-way table.</p> <p>The student will construct a two-way table by displaying frequencies and relative frequencies and interpret the table summarizing data on two categorical variables collected from the same subjects, including when missing components.</p>		<p><u>Sample Stems</u></p> <p>Using the information provided below, construct a two-way table displaying the frequencies and relative frequencies.</p> <table border="1"> <tr> <td></td><td>Soccer</td><td>American Football</td></tr> <tr> <td>Like it</td><td>47</td><td>21</td></tr> <tr> <td>Don't Like it</td><td>23</td><td>56</td></tr> </table> <p>Based on this survey, what interpretations can you make of the data?</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>		Soccer	American Football	Like it	47	21	Don't Like it	23	56
	Soccer	American Football									
Like it	47	21									
Don't Like it	23	56									
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>									
DOK Ceiling: 3											
Item Format: Selected Response, Constructed Response, Technology Enhanced											

Grade 8 Mathematics

Mathematics		8.DSP.A.4.b																								
DSP	Data Analysis, Statistics and Probability																									
A	Investigate patterns of association in bivariate data.																									
4	Understand the patterns of association in bivariate categorical data displayed in a two-way table.																									
b	Use relative frequencies calculated for rows or columns to describe possible association between the two variables.																									
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.DSP.A.4 (a and b) indicate how eighth-grade students will understand that patterns of association can also be seen in bivariate categorical data in a two-way table.</p> <p>The student will use relative frequencies calculated for rows or columns to describe possible association between the two variables, e.g., collect data from students in your class on whether or not they ride a bus to school and whether or not they have assigned chores at home. Is there evidence that those who ride a bus also tend to have chores?</p>		<p><u>Sample Stems</u></p> <p>The students at a middle school were asked to identify their favorite academic subject by grade level. The results are in the table below.</p> <table><tr><td>Grade</td><td>English</td><td>History</td><td>Math</td><td>Other</td><td>Total</td></tr><tr><td>7th Grade</td><td>40</td><td>36</td><td>28</td><td>14</td><td>118</td></tr><tr><td>8th Grade</td><td>48</td><td>45</td><td>70</td><td>18</td><td>181</td></tr><tr><td>Total</td><td>88</td><td>81</td><td>98</td><td>32</td><td>298</td></tr></table> <p>Is there an association between a favorite academic subject and grade level for this school? Support your conclusion. Be sure to include your calculations for appropriate relative frequencies using the given data.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>	Grade	English	History	Math	Other	Total	7 th Grade	40	36	28	14	118	8 th Grade	48	45	70	18	181	Total	88	81	98	32	298
Grade	English	History	Math	Other	Total																					
7 th Grade	40	36	28	14	118																					
8 th Grade	48	45	70	18	181																					
Total	88	81	98	32	298																					
<p>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</p> <p>Associations should be straightforward.</p>		<p>Calculator Designation</p> <p>YES – a calculator will be available for items</p>																								
<p>DOK Ceiling: 3</p>																										
<p>Item Format: Selected Response, Constructed Response, Technology Enhanced</p>																										

Grade 8 Mathematics

Mathematics		8.F.A.1.a
F	Functions	
A	Define, evaluate and compare functions.	
1	Explore the concept of functions. (The use of function notation is not required.)	
a	Understand that a function assigns to each input exactly one output.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.F.A.1 (a through c) indicate how eighth-grade students will explore the concept of functions.</p> <p>The student will understand that a function can be a verbal description, mapping, table, equation, or graph that assigns to each input exactly one output.</p> <p>Note: The use of function notation is not required.</p>		<p><u>Sample Stems</u></p> <p>Describe a situation in your experience that can represent a function. Explain how the situation represents a function.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>Do not use “domain” or “range” vocabulary.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

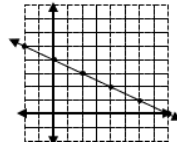
Grade 8 Mathematics

Mathematics		8.F.A.1.b
F	Functions	PRIORITY STANDARD
A	Define, evaluate and compare functions.	
1	Explore the concept of functions. (The use of function notation is not required.)	
b	Determine if a relation is a function.	
<u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u>		<u>Sample Stems</u>
The expectations in 8.F.A.1 (a through c) indicate how eighth-grade students will explore the concept of functions.		Alex is standing in front of the soda machine. Soda costs \$2 per can. There are 4 rows labeled A, B, C, and D and 5 columns. Alex's favorite soda is B5.
The student will determine if a relation is a function. Relations could include one or more of the following: verbal description, mapping, table, equation, or graph.		<ul style="list-style-type: none">• SITUATION A: When the \$2 is placed in the soda machine, all 20 sodas are an option for Alex.• SITUATION B: When Alex presses the B5 button, only his favorite soda will be sent out.
The student will recognize that a vertical line is not a function.		Are either of these situations a function? How do you know?
Note: The use of function notation is not required.		Additional Stems for 8 th Grade Found at End of Document.
<u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u>		<u>Calculator Designation</u>
Do not use “domain” or “range” vocabulary.		YES – a calculator will be available for items
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.F.A.1.c
F	Functions	
A	Define, evaluate and compare functions.	
1	Explore the concept of functions. (The use of function notation is not required.)	
C	Graph a function.	
<u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u> The expectations in 8.F.A.1 (a through c) indicate how eighth-grade students will explore the concept of functions. The student will graph a function from a verbal description, equation, mapping, ordered pairs, or table of values. Note: The use of function notation is not required.		<u>Sample Stems</u> Alex walks home from the library at a constant rate. Alex is 1.5 miles from home (d) and it takes 22 minutes (t) to get home. Graph a function to represent this situation. Describe how the information in this situation will generate a function.

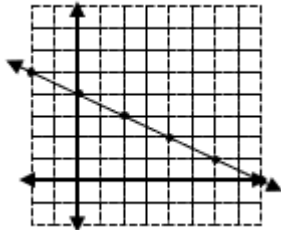
Grade 8 Mathematics

Mathematics		8.F.A.2														
F	Functions	PRIORITY STANDARD														
A	Define, evaluate and compare functions.															
2	Compare characteristics of two functions each represented in a different way.															
<u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u>		<u>Sample Stems</u>														
<p>The student will compare characteristics of two functions, each represented in a different way, e.g., verbal description, equation, mapping, ordered pairs, or table of values.</p> <p>In 8th grade the characteristics include comparing slopes (rates of change), x-intercepts, y-intercepts, and whether the functions represent continuous or discrete data.</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an <u>appropriate strategy</u> in a reasonable amount of time, <u>knowing multiple processes</u> and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context to compare characteristics of two functions each represented in a different way.</p>		<p>Compare the characteristics of three pairs of functions $f(x)$ and $g(x)$; $g(x)$ and $h(x)$; and $f(x)$ and $h(x)$.</p> <p>$f(x) = 2x - 4$</p> <p>$g(x)$</p> <table><tr><th>x</th><th>$g(x) = 0.5x - 4$</th></tr><tr><td>-2</td><td>-5</td></tr><tr><td>0</td><td>-4</td></tr><tr><td>2</td><td>-3</td></tr><tr><td>4</td><td>-2</td></tr><tr><td>6</td><td>-1</td></tr><tr><td>8</td><td>0</td></tr></table> <p>$h(x)$</p>  <p>Which two pairs of functions have the most similarities?</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>	x	$g(x) = 0.5x - 4$	-2	-5	0	-4	2	-3	4	-2	6	-1	8	0
x	$g(x) = 0.5x - 4$															
-2	-5															
0	-4															
2	-3															
4	-2															
6	-1															
8	0															
<u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u>		<u>Calculator Designation</u>														
This comparison will only address linear functions.		YES – a calculator will be available for items														
DOK Ceiling: 3																
Item Format: Selected Response, Constructed Response, Technology Enhanced																

Grade 8 Mathematics

Mathematics		8.F.A.3.a
F	Functions	
A	Define, evaluate and compare functions.	
3	Investigate the differences between linear and nonlinear functions.	
a	Interpret the equation $y = mx + b$ as defining a linear function, whose parameters are the slope (m) and the y-intercept (b).	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.F.A.3 (a through c) indicate how eighth-grade students will investigate the differences between linear and nonlinear functions.</p> <p>The student will interpret the equation of the form $y = mx + b$, as one way to represent a linear function for non-vertical lines. The parameters are the slope (rate of change) and the y-intercept.</p>		<p><u>Sample Stems</u></p> <p>The Woodshop Studio is a place where people who do not own table saws, bandsaws, and other woodworking tools can come and use them.</p> <p>Members of the Woodshop Studio can pay an initial \$40 fee to take the safety class then a \$15 monthly fee to remain a member.</p> <p>Tammy believes the equation to represent this function should be $C = 40m + 15$ and Tina thinks it would be $C = 15m + 40$, where C represents to total cost and m is the number of months they would be a member.</p> <p>Indicate which student is correct and use the parameters (slope and y-intercept) to support your conclusion. Also include whether this is a linear or nonlinear function.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.F.A.3.b
F	Functions	
A	Define, evaluate and compare functions.	
3	Investigate the differences between linear and nonlinear functions.	
b	Recognize that the graph of a linear function has a constant rate of change.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.F.A.3 (a through c) indicate how eighth-grade students will investigate the differences between linear and nonlinear functions.</p> <p>The student will be able to use a graph of a linear function to describe or demonstrate the constant rate of change.</p>		<p><u>Sample Stems</u></p> <p>Describe how you know that the following graph has a constant rate of change.</p>  <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>The graph must be given. Coordinate pairs must be clearly labeled with a point or fall on intersections of the coordinate grid.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.F.A.3.c
F	Functions	<p>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</p> <p>The expectations in 8.F.A.3 (a through c) indicate how eighth-grade students will investigate the differences between linear and nonlinear functions.</p> <p>The student will give examples of nonlinear functions in various forms (tables, graphs, verbal descriptions).</p>
A	Define, evaluate and compare functions.	
3	Investigate the differences between linear and nonlinear functions.	
c	Give examples of nonlinear functions.	
<p>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</p> <p>Students are not expected to name specific types of nonlinear functions.</p>		<p>Sample Stems</p> <p>Create or identify an example of a nonlinear function. Support how you know it is nonlinear using tables, graphs, or verbal descriptions.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p>DOK Ceiling: 3</p> <p>Item Format: Selected Response, Constructed Response, Technology Enhanced</p>		<p>Calculator Designation</p> <p>YES – a calculator will be available for items</p>

Grade 8 Mathematics

Mathematics		8.F.B.4.a
F	Functions	PRIORITY STANDARD
B	Use functions to model relationships between quantities.	
4	Use functions to model linear relationships between quantities.	
a	Explain the parameters of a linear function based on the context of a problem.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.F.B.4 (a through c) indicate how eighth-grade students will use functions to model linear relationships between quantities.</p> <p>The student will understand that the slope is the constant rate of change, and the y-intercept is the output when the input is zero. Explain (describe) their meanings in the context of a given situation. While other parameters exist, at the eighth-grade level, parameters the student should be able to determine include slope, y-intercept, and x-intercept.</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an appropriate strategy in a reasonable amount of time, knowing multiple processes and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context to explain the parameters of a linear function based on the context of a problem.</p>		<p><u>Sample Stems</u></p> <p>In track practice, Sheila is consistently running 1600 meters in 5 minutes and 30 seconds. Represent this consistency using a linear function. Be sure to explain the parameters (slope and intercepts) of the function given this situation.</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Mathematics		8.F.B.4.b																																																
F	Functions																																																	
B	Use functions to model relationships between quantities.																																																	
4	Use functions to model linear relationships between quantities.																																																	
b	Determine the parameters of a linear function.																																																	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The expectations in 8.F.B.4 (a through c) indicate how eighth-grade students will use functions to model linear relationships between quantities.</p> <p>The student will determine the slope and the y-intercept of a linear function given ordered pairs, tables, graphs, or a description of the relationship, with or without context. While other parameters exist, at the eighth-grade level, parameters the student should be able to determine include slope, y-intercept, and x-intercept.</p>		<p><u>Sample Stems</u></p> <p>Determine the parameters (slope and y-intercept) for each of the following functions.</p> <div><table><caption>Function A</caption><tr><th>x</th><th>y</th></tr><tr><td>-4</td><td>6</td></tr><tr><td>-2</td><td>6</td></tr><tr><td>1</td><td>6</td></tr><tr><td>3</td><td>6</td></tr><tr><td>5</td><td>6</td></tr></table><table><caption>Function B</caption><tr><th>x</th><th>y</th></tr><tr><td>-2</td><td>10</td></tr><tr><td>-1</td><td>7</td></tr><tr><td>0</td><td>4</td></tr><tr><td>1</td><td>1</td></tr><tr><td>2</td><td>-2</td></tr></table><table><caption>Function C</caption><tr><th>x</th><th>y</th></tr><tr><td>-4</td><td>-2</td></tr><tr><td>-2</td><td>2</td></tr><tr><td>0</td><td>6</td></tr><tr><td>2</td><td>10</td></tr><tr><td>4</td><td>14</td></tr></table><table><caption>Function D</caption><tr><th>x</th><th>y</th></tr><tr><td>-5</td><td>-2</td></tr><tr><td>-1</td><td>6</td></tr><tr><td>1</td><td>8</td></tr><tr><td>4</td><td>11</td></tr><tr><td>5</td><td>12</td></tr></table></div> <p>Which functions, if any, share the same parameter(s)?</p> <p>Additional Stems for 8th Grade Found at End of Document.</p>	x	y	-4	6	-2	6	1	6	3	6	5	6	x	y	-2	10	-1	7	0	4	1	1	2	-2	x	y	-4	-2	-2	2	0	6	2	10	4	14	x	y	-5	-2	-1	6	1	8	4	11	5	12
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<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>If the item includes a graph, the coordinate pairs must be clearly labeled with a point or fall on intersections of the coordinate grid.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>																																																
<p><u>DOK Ceiling:</u> 3</p>																																																		
<p><u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced</p>																																																		

Grade 8 Mathematics

Mathematics

8.F.B.4.c

- F** Functions
- B** Use functions to model relationships between quantities.
- 4** Use functions to model linear relationships between quantities.
- c** Determine the x -intercept of a linear function.

Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.

The expectations in 8.F.B.4 (a through c) indicate how eighth-grade students will use functions to model linear relationships between quantities.

The student will determine the x -intercept, if it exists. Describe its meaning in the given situation, with or without context.

Sample Stems

Determine the x -intercept for each of the following functions.

Function E		Function F	
x	y	x	y
-1	5	-2	4
1	3	0	3
2	2	2	2
3	1	4	1
5	-1	8	-1

Which functions, if any, share the same x -intercept?

Additional Stems for 8th Grade
Found at End of Document.

State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits

If the item includes a graph, the coordinate pairs must be clearly labeled with a point or fall on intersections of the coordinate grid lines.

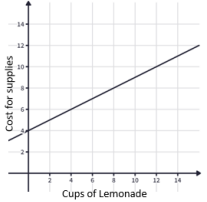
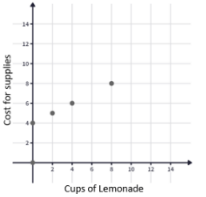
Calculator Designation

YES – a calculator will be available for items

DOK Ceiling: 3

Item Format: Selected Response, Constructed Response, Technology Enhanced

Grade 8 Mathematics

Mathematics		8.F.B.5
F	Functions	PRIORITY STANDARD
B	Use functions to model relationships between quantities.	
5	Describe the functional relationship between two quantities from a graph or a verbal description.	
<p><u>Expectation Unwrapped – the intent of this section is to describe the elements of the expectation, but are NOT additional standards or expectations.</u></p> <p>The student will model (describe) the functional relationship between two quantities given a verbal description, sketch, or graph, e.g., increasing, decreasing, or constant; linear or nonlinear; continuous or discrete.</p> <p>Note: Calculating the average rate of change for a nonlinear or discrete function is not part of eighth-grade content expectations.</p> <p>Mathematical Fluency is more than a quick answer on some timed test. Students demonstrate Fluency when they do mathematics using an <u>appropriate strategy</u> in a reasonable amount of time, <u>knowing multiple processes</u> and can apply or adapt strategies to find a correct solution.</p> <p>The student will use and explain multiple strategies to solve problems with or without context to describe the functional relationship between two quantities from a graph or a verbal description.</p>		<p><u>Sample Stems</u></p> <p>The two graphs below model two different views of a situation. Describe the functional relationship between the quantities being represented. Be sure to include how each relationship is changing as well as any other characteristics between the two graphs.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;">   </div> <p>Additional Stems for 8th Grade Found at End of Document.</p>
<p><u>State Assessment Content Limits/Boundaries - Classroom Work Should Extend Beyond These Limits</u></p> <p>No Limits.</p>		<p><u>Calculator Designation</u></p> <p>YES – a calculator will be available for items</p>
<u>DOK Ceiling:</u> 3		
<u>Item Format:</u> Selected Response, Constructed Response, Technology Enhanced		

Grade 8 Mathematics

Code	Sample Stem	Explanation
8.NS.A.1a	Given these numbers, which are rational numbers? Explain how you know that a number is rational. $\sqrt{2}$ $\sqrt{4}$ $\sqrt{25}$ 7.43 $\frac{1}{3}$ π $\sqrt{\frac{3}{2}}$	Students should recognize that rational numbers can be written in different forms while still being a rational number. $\sqrt{4}$, $\sqrt{25}$, 7.43, $\frac{1}{3}$ are all rational because they can be written in the form a/b where a and b are integers, and b is not equal to zero.
	Patti the Pattern Maker was exploring some numbers trying to grow her understanding of rational numbers. She knew she could show that $0.\overline{1212}$ is a rational number, but Patti wondered if $.121122111222\dots$ is also a rational number. Confirm that $0.\overline{1212}$ is rational, and help Patti decide about the other number.	Students should have the opportunity to explore a pattern in a decimal number and a pattern whose digits repeat in decimal numbers. Note: typically, $0.\overline{1212}$ would only be represented by $0.\overline{12}$ but for this question the number was shown differently.
8.NS.A.1b	Explain why $\frac{1}{3}$ is a rational number and why π is not.	Rational numbers can have terminating or repeating decimals, but π has neither.
8.NS.A.1c	Convert the following fraction into its decimal equivalent. $\frac{7}{111}$	
	Convert the following decimal into its rational equivalent $0.\overline{123}$	
8.NS.A.1d	Identify equivalent representations (fractions, decimals, or percentages) to the following rational numbers. $\frac{2}{9}$ $\frac{5}{6}$ 25% $\frac{5}{4}$ $\frac{45}{7}$	
8.NS.A.2	Estimate the value and compare the size of irrational numbers and approximate their locations on a number line. $\sqrt{3}$ $\sqrt{8}$ $\sqrt{30}$	

Grade 8 Mathematics

Code	Sample Stem	Explanation
8.EE1.A.1	Rewrite an equivalent expression by using the multiplicative inverse for any bases with negative exponents. $3^{-7} * 3^4$	Students should understand how the negative exponent can change the placement of the base in the numerator or denominator.
	Which operation, \times or \div , would create the largest solution for the following expression. $4^{\square} \bigcirc 4^{\square}$ Explain your answer using mathematical work and reasoning. How would the values used for exponents impact this problem?	Students should place the operation into the circle and identify the exponents to be used to create largest solution and explain their thinking and work. Other options include to randomly select the exponents, or have the result be the smallest, closest to one.
8.EE1.A.2a	Given a cube with volume of 512 cubic centimeters, make an equation that represents this situation using x to represent the cube's side length. Solve your equation for x .	
	Tina and Tom are working on the problems below. Help Tina and Tom decide if solving for x will result in a positive rational number. Show your work to help support your conclusions. $x^2 = 2.25$ $x^2 = 8$	
8.EE1.A.2b	Given a cube with volume of 64 cubic feet, find the length of a side of the cube. Support your solutions using mathematical equations, models, or other explanations.	
	A student finds the square root of 100 and 400. They wonder why these have rational square roots, but 200 and 300 do not. Compare these numbers and describe what is similar and different between them.	
8.EE1.A.2c	Show the result of the square root of the numbers listed below and verify the results by showing a model of the square root. $\frac{1}{25}$ 25	

Grade 8 Mathematics

Code	Sample Stem	Explanation
8.EE.A.3	The population of another country is almost four times larger than the population of the US. If this country's population is 1.44×10^9 what is the approximate population of the US?	Student will need to understand how computing with numbers in scientific notation impact the solution.
8.EE.A.4a	In 2020, the US population was 331.5 million and the population of Canada was 3.7×10^7 ; which population is larger and by approximately how many times?	
	In 2020, the US population was 331.5 million and the population of Iceland is 900 times smaller. What is the population of Iceland?	
8.EE.A.4b	The African Plate and the Eurasian Plate are converging, and the African Plate is moving north at an average rate of 2.7 centimeters per year relative to the Eurasian Plate. Convert this rate of tectonic plate movement into scientific notation, expressing the answer in millimeters per year.	

Grade 8 Mathematics

Code	Sample Stem	Explanation
	<p>Sheila and Patricia each made a graph showing the relationship between the lemon-lime soda and fruit juice used to make fruit punch. The recipe includes 1 two-liter bottle of lemon-lime soda and 2 cups of fruit juice. Identify the graph that represents the recipe for fruit punch. Explain your selection.</p> <div><div><p>Fruit Juice (number of cups)</p><p>Lemon-Lime Soda (number of 2-liter bottles)</p></div><div><p>Lemon-Lime Soda (number of 2-liter bottles)</p><p>Fruit Juice (number of cups)</p></div></div>	
8.EE1.B.5a	<p>Every 20 seconds an escalator step rises 12 feet. Draw a graph of the situation. Find the unit rate.</p>	
8.EE1.B.5b	<p>Audrey and Aaron have summer jobs stuffing envelopes for two different companies. Audrey earns \$12 for every 400 envelopes she finishes. Aaron earns \$6 for every 300 envelopes he finishes.</p> <p>Model these two proportional relationships using graphs, models, equations, or other representations to so each person’s earnings.</p> <p>Use those representations to compare each person’s earnings after stuffing the same number of envelopes? Be sure to include how the model represents your conclusions.</p>	

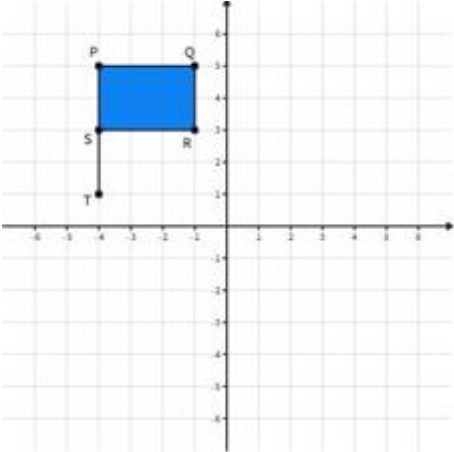
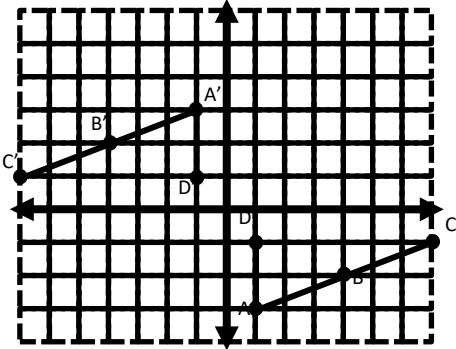
Grade 8 Mathematics

Code	Sample Stem	Explanation										
8.EEI.B.6a	The ADA (Americans with Disabilities Act) states that ramps may have a maximum slope of 1:12. Explain whether the slope of the incline, represented on a cartesian plane, through (0,0) and (1,12) could be the same as the slope of the line through points (1,12) and (3, 36).											
8.EEI.B.6b	Use the table below to create a slope intercept equation. Be sure to indicate the value of the slope and y intercept. <table border="1"><tr><td>x</td><td>y</td></tr><tr><td>2</td><td>7</td></tr><tr><td>4</td><td>10</td></tr><tr><td>5</td><td>11.5</td></tr><tr><td>6</td><td>13</td></tr></table>	x	y	2	7	4	10	5	11.5	6	13	
	x	y										
2	7											
4	10											
5	11.5											
6	13											
	Jenny goes to a fair with \$40 to spend on rides. Each ride costs Jenny \$5. Write an equation in slope intercept form to represent Jenny’s situation showing the relationship between the amount of money Jenny has and the number of rides she takes.											
8.EEI.C.7a	There are three types of solutions for linear equations; two are represented in the given equations. What is the solution of each equation? Create an equation to represent the type of solution that is not represented. $3 = 2x + 7$ $2y = 2y + 4$	Students will have to know all three types of solutions for linear equations AND create the missing one (infinitely many solutions).										
	Add a value to the equation below to create an equation with no solutions. $-4x + 4 = \underline{\hspace{1cm}}x + 2$											
	Without solving the problem, how can you tell if the equation will have 0, 1 or infinite solutions?											
8.EEI.C.7b	Solve the following equation. $\frac{4m-7}{3} = 7.$	Teachers can use various structures of equations to discuss various approaches to solving the equation as well as properties the students are using, e.g., the distributive property.										
	Using the two equations below, describe the similarities and differences for solving each. $\frac{4m-7}{3} = 7$ $\frac{4m-7}{3} = 7m$											

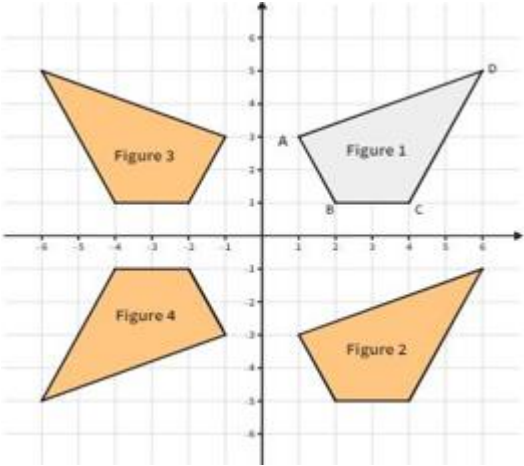
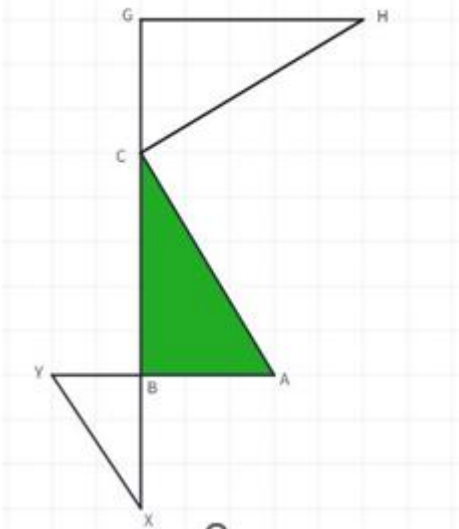
Grade 8 Mathematics

	<p>Solve the following inequality.</p> $\frac{4}{5}a - 6 > \frac{3}{5}a$ <p>After determining the solution, describe how the answer makes sense in context of the problem.</p>	
Code	Sample Stem	Explanation
8.EE1.C.8a	Two lines intersect at (6,2). Where else will they intersect and how do you know?	Since any two lines will either intersect 0, 1, or infinite times, students will need to address the possibilities given this situation. Because there is an intersection given only two possibilities exist.
8.EE1.C.8b	Alex is in town for 4-weeks to take a class. He wants to join a gym while in town. Which deal is the best one? OPTION A: Pay \$14/week or OPTION B: Pay \$48 membership and \$2/week. If his class is extended for one extra week, explain how this might affect your answer?	Student should be able to compare the two options and see when either is a better choice.
8.EE1.C.8c	Given the following system, what would the values of Q and P need to be for each of these situations: An infinite number of solutions, one solution, and no solutions. Explain your choices. $y = 3x + 8$ and $y = Qx + P$	The student must understand relationship of slope (Q) and y-intercept (P) in each of the solutions. The student would have to understand that in a system under what conditions would the result lead to either infinitely many solutions, one solution, or no solutions.
8.EE1.C.8d	<p>The local bowling alley is making a special offer. They usually charge \$3.50 per day to bowl. This month bowlers can pay an enrollment fee of \$15 and then the daily pass will only be \$2 per day.</p> <p>Create two linear equations to represent this situation and solve this system of equations. Given the context of this situation, what will the solution represent?</p>	

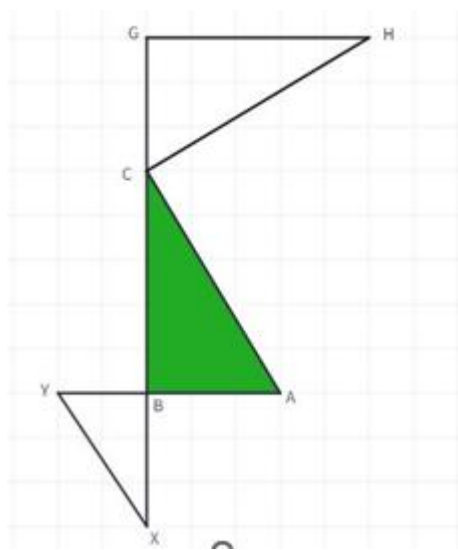
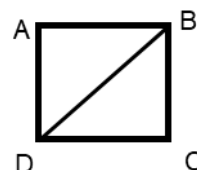
Grade 8 Mathematics

Code	Sample Stem	Explanation
	<p>Given the image below, how have the translations listed impacted the angle measures and segment lengths? Describe the impact of both translations.</p> <p>Translate the Figure PQRST right 6 units. Draw and label the new image. Next rotate that image 90 degrees clockwise; draw and label this new image.</p> 	
8.GM.A.1a	<p>Alex does not believe that angle A'B'C' has been rotated 180 degrees about the origin and is the image of Angle ABC. What can you share with Alex to convince him that this is true?</p> 	

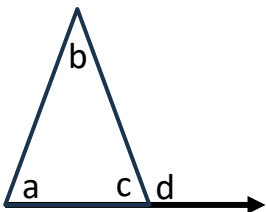
Grade 8 Mathematics

Code	Sample Stem	Explanation
8.GM.A.1b	<p>Figure 1 has been transformed into each of the other figures shown below. Identify what transformations were used for each figure and describe how the transformation affected the order of the figure's points.</p> 	
8.GM.A.2a	<p>Given the figure below, identify which triangle is congruent to triangle ABC. Be sure to indicate the transformation used to generate the congruent triangle and how you know they must be congruent.</p> 	

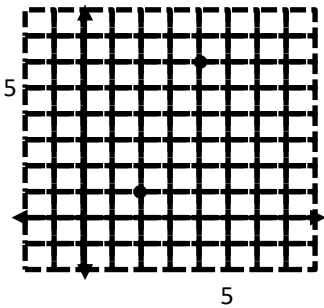
Grade 8 Mathematics

Code	Sample Stem	Explanation
8.GM.A.3	<p>The following points are graphed on a coordinate graph A(0,0), B(3,3), and C(2,0). Triangle ABC is dilated by a scale factor of 2, rotated clockwise 90 degrees about the origin then translated up 4 units. Describe what each transformation will do to the coordinate value of each vertex.</p>	
	<p>The following points are graphed on a coordinate graph A(0,0), B(3,3), and C(2,0). Triangle ABC is dilated by a scale factor of 2, rotated clockwise 90 degrees about the origin then translated up 4 units.</p> <p>If the transformations were performed in the reverse order, describe how would the final figure compare to the original transformation.</p>	
8.GM.A.4a	<p>Given the figure below, identify which triangle is similar to triangle ABC. Be sure to indicate the transformation used to generate the similar triangle and how you know they must be congruent.</p> 	
8.GM.A.5a	<p>Use the square below to explain how you can find the sum of the measures of triangle ABC.</p> 	<p>This is not the traditional derivation for the interior angles of a triangle; however, a student should be able to find the correct number of degrees.</p>

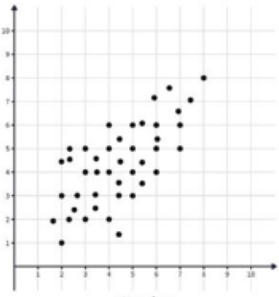
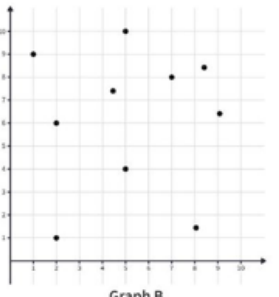
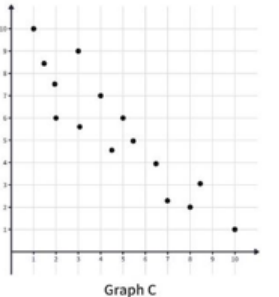
Grade 8 Mathematics

Code	Sample Stem	Explanation
8.GM.A.5b	<p>The figure below contains an isosceles triangle with one side extending beyond. If angle a is 60°, what can be determined about the other angles?</p>  <p>Explain how you know that these angles are correct, given angle a.</p>	
8.GM.A.5c	<p>Draw or create a rectangle with a line drawn through opposite vertices. Explain how this drawing models two parallel lines cut by a transversal.</p> <p>Use your representation to describe what you know about all the angles created. Be sure to label the angles discussed and include the following concepts: alternate interior angles, alternate exterior angles, corresponding angles, same side interior angles/consecutive interior angles, vertical angles.</p>	It would not be necessary to have students address all possible angles, e.g., alternate interior angles, alternate exterior angles, corresponding angles, same side interior angles/consecutive interior angles, vertical angles, in one problem. This could be split into several questions or problems.
8.GM.A.5d	<p>Polly is thinking about similar figures and shapes. She believes that any square will be similar to all larger squares. However, she does not believe that any parallelogram (that isn't a square) will be similar to all larger parallelograms.</p> <p>Use properties of similar figures to explain whether Polly is correct or not.</p>	
8.GM.B.6	<p>Given a right triangle with side lengths 3, 4 and 5, demonstrate that the Pythagorean Theorem is true. Support your answer using shapes scaled to each side length, e.g., squares, semi-circles.</p>	Other right triangles can be used for this question as well as other shapes instead of squares, e.g., equilateral triangles
8.GM.B.7	<p>The standard doorway into a house is 36 inches by 80 inches. The newly purchased sofa is too wide (40 inches) to get through the door right side up and too long (84 inches) to get through the door if stood on its side. Will the sofa fit through the door diagonally? How do you know?</p>	

Grade 8 Mathematics

Code	Sample Stem	Explanation
8.GM.B.8	<p>Use the Pythagorean Theorem to find the distance between the two coordinates shown in the graph below.</p> 	
8.GM.C.9a	<p>Compare the surface area for two rectangular pyramids. Both have a pyramid height of 10, one has a square base (side length 5), and the other has a rectangular base (side lengths 4 by 6). Support your comparison using words, equations, models, or other strategies.</p>	
8.GM.C.9b	<p>Compare the volume for these 3 figures. A pyramid height of 10 with a square base (side length 5); a cone with a base having a diameter of 5 and a height of 10; and a sphere with radius of 5. Support your comparison using words, equations, models, or other strategies.</p>	

Grade 8 Mathematics

Code	Sample Stem	Explanation
	<p>Compare the 3 graphs below. Be sure to include any patterns observed such as clustering, outliers, positive or negative relationship (correlation) and the strength of the relationship (correlation) linear association and nonlinear association.</p> <div><p>Graph A</p><p>Graph B</p><p>Graph C</p></div>	
8.DSP.A.1		

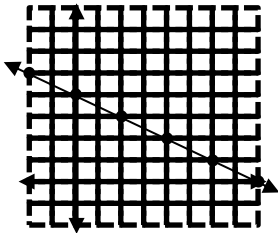
Grade 8 Mathematics

Code	Sample Stem	Explanation									
8.DSP.A.2	<p>Using the data shown in the graph below, Tim has used the coordinates (8, 2) and (3, 7) to make a trend line as his best fit. Find the equation using Tim’s coordinates and evaluate the fit of the selected line.</p> <p>Describe any line that would seem to be a better fit given this data.</p>										
8.DSP.A.3	<p>The graph below shows the height of a variety of sunflower plants after weeks of growth. Use the parameters of the given line of best fit to describe the given situation and predict the expected height at 6 weeks after planting.</p> <p>Height in Feet</p> <p>Weeks after planting</p>										
8.DSP.A.4a	<p>Using the information provided below, construct a two-way table displaying the frequencies and relative frequencies.</p> <table><tr><td></td><td>Soccer</td><td>American Football</td></tr><tr><td>Like it</td><td>47</td><td>21</td></tr><tr><td>Don't Like it</td><td>23</td><td>56</td></tr></table> <p>Based on this survey, what interpretations can you make of the data?</p>		Soccer	American Football	Like it	47	21	Don't Like it	23	56	
	Soccer	American Football									
Like it	47	21									
Don't Like it	23	56									

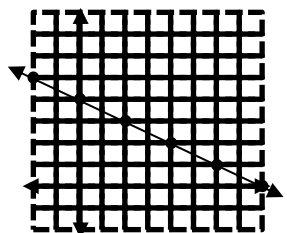
Grade 8 Mathematics

Code	Sample Stem	Explanation																													
8.DSP.A.4b	<p>The students at a middle school were asked to identify their favorite academic subject by grade level. The results are in the table below.</p> <table><tr><th>Grade</th><th>English</th><th>History</th><th>Math</th><th>Other</th><th>Total</th></tr><tr><td>7th Grade</td><td>40</td><td>36</td><td>28</td><td>14</td><td>118</td></tr><tr><td>8th Grade</td><td>48</td><td>45</td><td>70</td><td>18</td><td>181</td></tr><tr><td>Total</td><td>88</td><td>81</td><td>98</td><td>32</td><td>298</td></tr></table> <p>Is there an association between a favorite academic subject and grade level for this school? Support your conclusion. Be sure to include your calculations for appropriate relative frequencies using the given data.</p>	Grade	English	History	Math	Other	Total	7 th Grade	40	36	28	14	118	8 th Grade	48	45	70	18	181	Total	88	81	98	32	298						
	Grade	English	History	Math	Other	Total																									
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8 th Grade	48	45	70	18	181																										
Total	88	81	98	32	298																										
8.F.A.1a	<p>Describe a situation in your experience that can represent a function. Explain how the situation represents a function.</p>																														
8.F.A.1b	<p>Alex is standing in front of the soda machine. Soda costs \$2 per can. There are 4 rows labeled A, B, C, and D and 5 columns. Alex's favorite soda is B5. SITUATION A: When the \$2 is placed in the soda machine, all 20 sodas are an option for Alex. SITUATION B: When Alex presses the B5 button, only his favorite soda will be sent out. Is either of these situations a function? How do you know?</p>																														
8.F.A.1c	<p>Alex walks home from the library at a constant rate. Alex is 1.5 miles from home (d) and it takes 22 minutes (t) to get home. Graph a function to represent this situation. Describe how the information in this situation will generate a function.</p>																														
	<p>The date in the table below shows the high temperature for two weeks in Missouri.</p> <table><tr><td>April</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td></tr><tr><td>Temp</td><td>41</td><td>63</td><td>80</td><td>44</td><td>54</td><td>41</td><td>45</td><td>51</td><td>57</td><td>56</td><td>58</td><td>58</td><td>56</td><td>34</td></tr></table> <p>Graph the function.</p>	April	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Temp	41	63	80	44	54	41	45	51	57	56	58	58	56	34
April	1	2	3	4	5	6	7	8	9	10	11	12	13	14																	
Temp	41	63	80	44	54	41	45	51	57	56	58	58	56	34																	

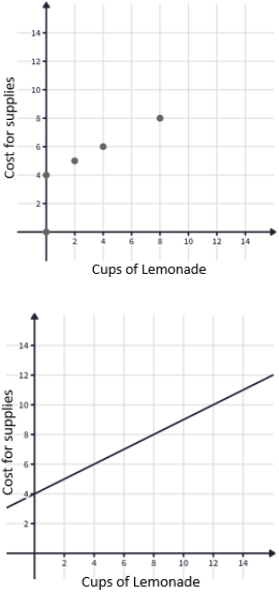
Grade 8 Mathematics

Code	Sample Stem	Explanation														
8.F.A.2	<p>Compare the characteristics of three pair of functions $f(x)$ and $g(x)$; $g(x)$ and $h(x)$; and $f(x)$ and $h(x)$.</p> <p>$f(x) = 2x - 4$</p> <p>$g(x)$</p> <table border="1"><tr><td>x</td><td>$g(x) = 0.5x - 4$</td></tr><tr><td>-2</td><td>-5</td></tr><tr><td>0</td><td>-4</td></tr><tr><td>2</td><td>-3</td></tr><tr><td>4</td><td>-2</td></tr><tr><td>6</td><td>-1</td></tr><tr><td>8</td><td>0</td></tr></table> <p>$h(x)$</p>  <p>Which two pair of functions have the most similarities, be sure to include the following characteristics: comparing slopes (rates of change), x-intercepts, y-intercepts, and whether the functions represent continuous or discrete data.</p>	x	$g(x) = 0.5x - 4$	-2	-5	0	-4	2	-3	4	-2	6	-1	8	0	
x	$g(x) = 0.5x - 4$															
-2	-5															
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2	-3															
4	-2															
6	-1															
8	0															
8.F.A.3a	<p>The Woodshop Studio is a place where people who do not own table saws, bandsaws, and other woodworking tools can come and use them.</p> <p>Members of the Woodshop Studio can pay an initial \$40 fee to take the safety class then a \$15 monthly fee to remain a member.</p> <p>Tammy believes the equation to represent this function should be $C = 40m + 15$ and Tina thinks it would be $C = 15m + 40$, where C represents to total cost and m is the number of months they would be a member.</p> <p>Indicate which student is correct and use the parameters (slope and y-intercept) to support your conclusion. Also include whether this is a linear or nonlinear function.</p>															

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8.F.A.3b	<p>Describe how you know that the following graph has a constant rate of change.</p> 																																																									
8.F.A.3c	<p>Create or identify an example of a nonlinear function. Support how you know it is nonlinear using tables, graphs, or verbal descriptions.</p>																																																									
8.F.B.4a	<p>In track practice, Sheila is consistently running 1600 meters in 5 minutes and 30 seconds. Represent this consistency using a linear function. Be sure to explain the parameters (slope and intercepts) of the function given this situation.</p>	<p>Students should have used the distance formula, distance = rate x time, and this might be a suggestion needed.</p>																																																								
8.F.B.4b	<p>Determine the parameters (slope and y-intercept) for each of the following functions.</p> <table border="1" data-bbox="412 995 501 1184"><thead><tr><th colspan="2">Function A</th></tr><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>-4</td><td>6</td></tr><tr><td>-2</td><td>6</td></tr><tr><td>1</td><td>6</td></tr><tr><td>3</td><td>6</td></tr><tr><td>5</td><td>6</td></tr></tbody></table> <table border="1" data-bbox="542 995 631 1184"><thead><tr><th colspan="2">Function B</th></tr><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>-2</td><td>10</td></tr><tr><td>-1</td><td>7</td></tr><tr><td>0</td><td>4</td></tr><tr><td>1</td><td>1</td></tr><tr><td>2</td><td>-2</td></tr></tbody></table> <table border="1" data-bbox="672 995 761 1184"><thead><tr><th colspan="2">Function C</th></tr><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>-4</td><td>-2</td></tr><tr><td>-2</td><td>2</td></tr><tr><td>0</td><td>6</td></tr><tr><td>2</td><td>10</td></tr><tr><td>4</td><td>14</td></tr></tbody></table> <table border="1" data-bbox="802 995 891 1184"><thead><tr><th colspan="2">Function D</th></tr><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>-5</td><td>-2</td></tr><tr><td>-1</td><td>6</td></tr><tr><td>1</td><td>8</td></tr><tr><td>4</td><td>11</td></tr><tr><td>5</td><td>12</td></tr></tbody></table> <p>Which functions, if any, share the same parameter(s)?</p>	Function A		x	y	-4	6	-2	6	1	6	3	6	5	6	Function B		x	y	-2	10	-1	7	0	4	1	1	2	-2	Function C		x	y	-4	-2	-2	2	0	6	2	10	4	14	Function D		x	y	-5	-2	-1	6	1	8	4	11	5	12	
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8.F.B.4c	<p>Determine the x-intercept for each of the following functions.</p> <table border="1" data-bbox="420 1478 509 1667"><thead><tr><th colspan="2">Function E</th></tr><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>-1</td><td>5</td></tr><tr><td>1</td><td>3</td></tr><tr><td>2</td><td>2</td></tr><tr><td>3</td><td>1</td></tr><tr><td>5</td><td>-1</td></tr></tbody></table> <table border="1" data-bbox="550 1478 639 1667"><thead><tr><th colspan="2">Function F</th></tr><tr><th>x</th><th>y</th></tr></thead><tbody><tr><td>-2</td><td>4</td></tr><tr><td>0</td><td>3</td></tr><tr><td>2</td><td>2</td></tr><tr><td>4</td><td>1</td></tr><tr><td>8</td><td>-1</td></tr></tbody></table> <p>Which functions, if any, share the same x-intercept?</p>	Function E		x	y	-1	5	1	3	2	2	3	1	5	-1	Function F		x	y	-2	4	0	3	2	2	4	1	8	-1																													
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Grade 8 Mathematics

Code	Sample Stem	Explanation
8.F.B.5	<p>The two graphs below model two different views of a situation. Describe the functional relationship between the quantities being represented. Be sure to include how each relationship is changing as well as any other characteristics between the two graphs.</p> <div><p>The top graph is a scatter plot with the x-axis labeled 'Cups of Lemonade' and the y-axis labeled 'Cost for supplies'. Both axes range from 0 to 14 with grid lines every 2 units. Three points are plotted at (2, 5), (4, 6), and (8, 8). The bottom graph is a line on the same axes. The line starts at (0, 4) and passes through (14, 12), showing a constant positive slope of 1/2.</p></div>	